NATIONAL AGRICULTURAL CHEMICALS ASSOCIATION

NEWS

AND PESTICIDE REVIEW

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NATIONAL AGRICULTURAL CHEMICALS ASSOCIATION

NEWS

AND PESTICIDE REVIEW

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Read The Label

One of the most significant new factors in American farming became a full reality when the Miller Pesticide Residue Amendment became fully effective July 22, 1956.

As is well-known by now, this amendment to the Food, Drug and Cosmetic Act was signed into law on July 22, 1954 to assure the nation of an abundant and safe food supply insofar as agricultural chemicals are concerned.

In commenting on the amendment recently, Dr. A. L. Miller, Member of Congress from Nebraska and author of the measure, stated, "Agricultural chemicals are necessary to produce food. The Miller Amendment makes it possible for growers to use these chemicals safely." Referring to consumers, he added, "This legislation provides safety for you and your family every time you eat."

What the term "fully effective" means is that now all pesticide chemicals which leave a residue in or on crops are covered by the law. This growing season—the first season of operation under the law—has moved along with a minimum of problems for growers.

As the harvest season progresses, however, it is doubly important that all growers be made aware of the purposes of the law and of their responsibilities for complying with it.

The essential point to be made clear is that to comply with the law, growers must read the label and follow label directions. Pesticides should be applied only on the crops specified, in the amounts specified, and at the times specified. This is particularly important as regards the last time of application before harvest.

If growers continue to follow label directions, if they use approved pesticides and apply them properly, they can complete the first full season under the Miller Amendment with a record of which they can be proud.

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The NAC News and Pesticide Review is the official publication of the National Agricultural Chemicals Association, 1145 19th St., N. W., Washington 6, D. C. Telephone: STerling: 3-2833. L. S. Hitchner, Executive Secretary.

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Insects, Diseases, Weeds Are World Travellers; Face U.S.D.A. With Major Quarantine Task

During the past few years the United States has experienced major outbreaks of a number of especially destructive insects. These have included the Khapra beetle, the spotted alfalfa aphid and the Mediterranean fruit fly.

The cost of these pests to the American farm economy has been tremendous. A total of $10,000,000 will be spent by July 1, 1957 on efforts to eradicate the Mediterranean fruit fly in Florida. The spotted alfalfa aphid, which first appeared in this country in 1954, is credited with destroying $35,000,000 worth of alfalfa in the Southwest this year alone.

Natural questions for the general public as well as for the American farmer to ask are, "Where do these pests come from? How do these destructive outbreaks occur?"

One common denominator characterizes the serious and unexpected outbreaks of farm pests during the past few years. The pests came into the United States from abroad. It is not known exactly how these three pests travelled. But it is known that insects come into the United States as stowaways in airplanes, ships, automobiles, and trains. They may be on host plants, in soil clinging to imported products, in the baggage or on the clothes of travellers.

Even powerful air currents and storms bring insects to the United States from Caribbean islands, Mexico, Central and South America and Canada, and winds further act to transport pests from one state to another. Some migrate north annually. Others are caught up by chance and are brought into the country.

Size of Task Described

Here it is well to point out that the United States is not the only country faced with the problems created by imported farm pests. This is a global problem facing virtually every country of the world. Where the natural environments of plant pests are disturbed by the activities of men, and where modern means of travel are available, you can expect to find insect, plant disease and weed hitchhikers.

The problem was explained recently in the "Agricultural Research" bulletin of the U. S. Department of Agriculture by citing a few actual examples in these words: "Transient field workers cross the border from Mexico to Texas cotton country with their few possessions in pick sacks—which also contain remains of seed cotton infested with the destructive pink bollworm, and mangoes and other fruit, hosts to the Mexican fruit fly . . . A ship docking at Mobile has in its stores rice from India infested with the Khapra beetle, the world's worst stored-grain pest . . . In the customs line on a New York pier the trunk of a passenger from Spain enroute to California yields a carton of fresh fruit containing larva of the Medeterranean fruit fly, a continuing threat to our vital citrus industry . . . From England comes a shipment of small cars, their underparts caked with soil contaminated with cysts of the golden nematode, a tiny root pest highly destructive to potatoes and tomatoes."

Multiply these incidents a thousandfold and you have some idea of how big and complex a job it is to keep plant pest immigrants out of this country. No ways exist for keeping out pest immigrants which are carried in by means of winds short of controlling them in the lands whence they come. Keeping out other pest immigrants is the job of the Plant Quarantine Branch of USDA's Agricultural Research Service.

Plant quarantine inspectors are stationed at border, sea, and air ports to carry out provisions of the plant-quarantine laws designed to protect our food and plant resources. These inspectors check airplanes, steamships, trains and automobiles, and examine cargo, stores, baggage and mail for plant materials and foods that might contain dangerous plant pest stowaways.

During the past year, plant quarrantine inspectors intercepted some 17,500 lots of destructive pests—11,600 insects and 5,900 diseases—from throughout the world. They examined 54,700 vessels and 101,000 planes from overseas as well as 17,000,000 motor vehicles, 101,000 freight cars and 2,200 pullmans and coaches arriving from Mexico.

Often, unusual traffic loads must be met. For example, last year at one airport alone (Idlewild, N. Y.) members of the plant quarantine inspection staff cleared an average of 50 transatlantic planes daily during the peak month of July.

Commercial imports of plants and plant materials are relatively simple for inspectors to control. Much of this material is certified by the country of origin as meeting sanitary growing and packing conditions. Nevertheless, inspectors examine such shipments to assure that they are free from pests and that no contaminating soil of prohibited pack-

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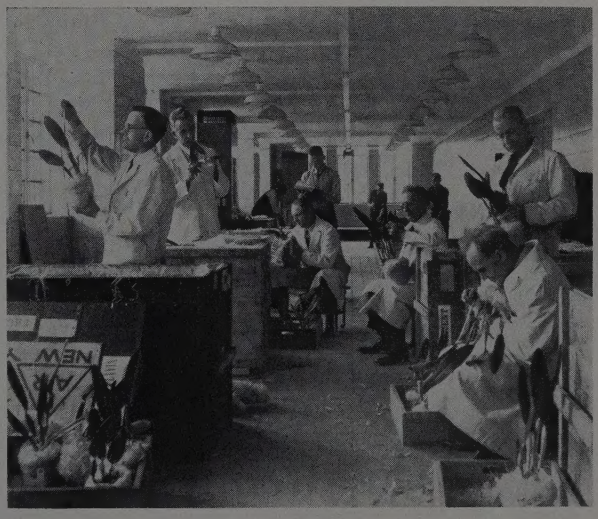
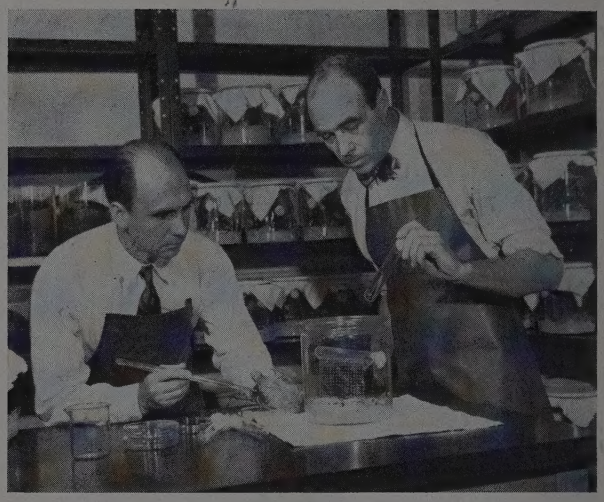


U.S.D.A. Inspectors Check Incoming Plants

The Role of Entomologists in Industry*



How do 5 million fewer farmers produce 30 percent more food and fiber today than was produced 25 years ago? One reason, and perhaps the most important one, has been the rapid growth of agricultural research.

By seeking out new facts, by developing new farming equipment and practices, and by discovering new chemicals to stimulate and protect crops, ways have been found to increase crop yields, upgrade crop quality and reduce per-unit costs of farm production.

As the importance of science in agriculture has increased, the need for men and women trained in agricultural sciences has grown. The need is not only for research scientists. Technically-trained men and women also are needed to explain the new developments to growers, to demonstrate the benefits of new materials and to encourage growers to put improved farming methods into practice.

Demand Outrunning Supply

How far demand for technically-trained men and women in agriculture is outrunning current supply has been pointed out by Dr. J. Wayne Reitz, President of the University of Florida. Earlier this year Dr. Reitz stated, "The current demand is for 15,000 graduates each year from our colleges of agriculture and home economics. Yet it is estimated that only 8,500 students will receive degrees in 1956. In simpler terms, there are two jobs waiting for every graduate."

A recent survey of companies in the agricultural chemicals industry made by the National Agricultural Chemicals Association has disclosed that there is a shortage in the industry of entomologists, plant pathologists, plant physiologists and those trained in related sciences. As the industry expands, it is expected that this shortage will become more pronounced.

The increasingly important role played by scientists in the agricultural chemicals industry is illustrated by the record of one of these scientific groups—entomologists.

Commercial Entomologists

This record, which is far from complete shows that 13 entomologists had entered commercial organizations up to 1920. The number was increased by more than 40 between 1920 and 1929. The number of entomologists joining business firms for the first time dropped to just over 30 between 1930 and 1939. Then, reflecting a general expansion of the agricultural chemicals industry, the number jumped to more than 60 between 1940 and 1949. During the first six years of this decade—1950 to 1956—more than 70 entomologists entered commercial organizations.

This, of course, is just a sampling of the estimated 650 to 700 entomologists now working in commercial enterprises —some as research scientists, some as salesmen, some as office managers, vice presidents in charge of research, and presidents or chief officers of divisions directing research, production and sales. Yet, the sampling does disclose the increasing need of industry for men and women with technical knowledge in this field.

While official entomology can be said to have begun in 1854 with the appointment of Townend Glover as Entomologist of the newly-created Bureau of Agriculture of the U. S. Patent Office, what might be called commercial entomology did not begin until 1904. In that year Dr. Otto H. Swezey left Ohio State University to become Assistant Entomologist in the Experiment Station of the Hawaiian Sugar Planters Association.

The turn of the century marked a turning point for American agriculture. Modern large-scale farming was just being established. The automobile which was to lead to wide-spread mechanization of farming had just been introduced. Chemical companies were just starting to bring their scientific know-how into the production and formulation of chemical sprays and dusts to aid the farmer.

Many Entering Business

Spurred on by these exciting developments, the number of entomologists moving into commercial enterprises began to grow at an ever increasing pace. A survey of some 250 entomologists whose dates of starting work in business organizations are known demonstrates the growing importance of entomology to all phases of commercial pest control.

The most generally accepted figure is that some 4500 persons now follow the

*Based on material prepared by Dr. Mortimer D. Leonard, Consulting Entomologist, Agricultural Chemicals Sales Division, Shell Chemical Corporation, for presentation at the Tenth International Congress of Entomology, Montreal, Canada, August 1956.

profession of entomology. That means that nearly 15 percent of professional entomologists today are in commercial organizations.

What are these commercial organizations? Starting around 50 years ago entomologists began to enter a growing number of different kinds of business enterprises. Although these several fields are not always subject to clear definition and may be somewhat overlapping, they can be designated as the agricultural chemicals industry, structural pest control operators (PCO's); growers' organizations, supervised pest control, commercial crop dusting and spraying, the grain and milling trade, seed growers, canning companies, tree experts, the dairy industry, biological supply houses, and commercial parasite production.

Agricultural Chemicals Needs

Agricultural Chemicals Industry: Since early in its history the agricultural chemicals industry has employed entomologists to test new compounds in the laboratory and in the field, and to test and expand the uses of older compounds. More recently, entomologists also have found opportunities as technical salesmen, sales managers, and administrators in top management.

In what might be called the "pioneer period" of the industry—that is, during the years prior to 1920—five of a total of 13 entomologists who entered commercial work joined pesticide manufacturers. In the decade of 1920-1929 at least three times as many entomologists entered the commercial field as during all previous years, and about two-thirds of these joined pesticide firms. Between 1930 and 1939 at least three-fourths of all entomologists entering the commercial field joined pesticide manufacturers. This total jumped to 80 to 85 percent between 1940 and 1949, and has now leveled off at around 60 percent. The best estimate is that approximately 70 percent of all commercial entomologists today are presently employed in the agricultural chemicals industry.

The survey of its member companies made recently by the National Agricultural Chemicals Association indicates considerably increased employment of entomologists, as well as of plant pathologists and those trained in related agricultural sciences, during the next few years. This expectation is based on the predicted expansion of the industry, the increasing diversity of pesticides and the complexity of control measures. This opens more opportunities for entomologists in research, product development, technical sales and administrative positions.

Structural Pest Control Operators (PCO's): Nearly 100 years ago Solomon Rose started a business in Cincinnati for the control of insects which infest houses and other buildings. Similar firms were started and today there are more than 900 PCO's throughout the country.

The first graduate entomologist to go into this business was E. R. Barber in 1922. In 1946 a forward step was taken by J. J. Davis when he organized a four-year course at Purdue University especially designed to fit entomologists to enter the pest control operator business. An increasing number of entomologists have been entering this field during the past ten years. It is now estimated that there are more than 100 graduate entomologists in this field today.

Growers' Organizations

Growers' Organizations: Sugar producers were the first growers' organization to employ entomologists. The first commercial entomologist, in fact, was employed by the Hawaiian Sugar Planters Association in 1904. Thereafter, sugar producing companies in various areas have employed entomologists. Entomologists have been employed by the citrus industry, in the vegetable and tobacco industries and by at least one large fruit company which maintains a program of research in tropical agriculture.

Supervised Pest Control Services: A type of commercial service to large-scale growers has been developed in recent years known as Supervised Pest Control. Several large-scale farmers and individual organizations band together to employ an entomologist. During summer months some such groups employ as many as seven entomologists to advise on pest control procedures on such crops as alfalfa hay, alfalfa seed and cotton. An idea of the extent of these operations is indicated by the fact that one Supervised Pest Control Service now handled 5,000 acres, another 7,500 acres, and another 25,000 to 35,000 acres.

Other Groups

Commercial Crop Dusting and Spraying: Firms specializing in the commercial application of sprays and dusts began to be organized in the 1920's. Although personnel of these firms receive special training at seminars held by a number of Land Grant Colleges, a number of these firms also employ entomologists.

The Forest Products Industry: Companies which grow trees for lumber and for the manufacture of forest products are paying more attention to insect losses and means for combatting them today than ever before. At present, six or more firms in this field employ graduate forest entomologists.

The Grain and Milling Trade: For some years milling and grain processing companies have employed college graduates with training in entomology for the control of such factors as moisture, rodents, fungi and stored grain insects.

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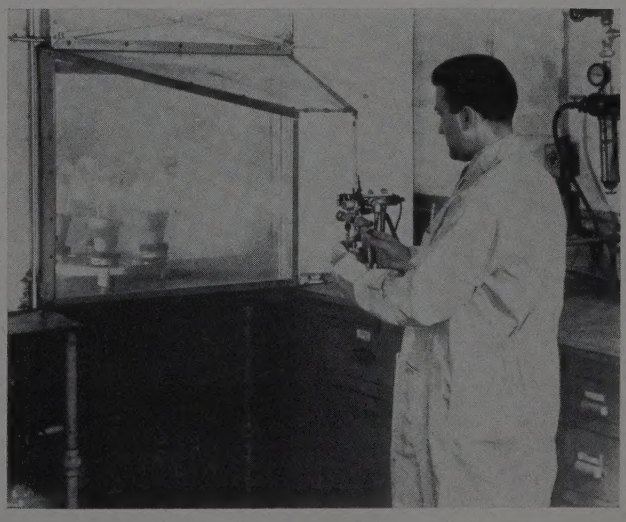
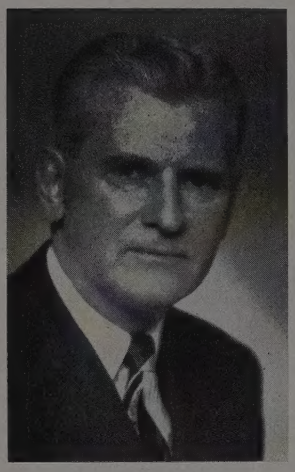


Company Entomologist Testing New Insecticide



Mr. J. V. Vernon

Dr. E. F. Knipling

NAC Annual Meeting At Spring Lake, N. J.

Industry Outlook—Who and What Influences Growers To Buy Pesticides To Be Highlighted at Meeting

Who and what influences growers to buy and use agricultural chemicals will be one of the major topics to be discussed at the 23rd Annual Meeting of the National Agricultural Chemicals Association in Spring Lake, New Jersey, September 5, 6 and 7.

The three-day meeting also will feature a presidential address by W. W. Allen, Manager, Agricultural Chemical Sales, The Dow Chemical Company, Midland, Michigan, and NAC President; a report on entomological research by Dr. E. F. Knipling, Chief, Entomological Research Branch, Agricultural Research Service, U. S. D. A.; and a talk on the "Industry Outlook" by J. V. Vernon, President, Niagara Chemical Division, Food Machinery & Chemical Corporation, Middleport, New York.

Over 500 To Attend

More than 500 leaders in the agricultural chemicals industry, in Government, and in agricultural communications are expected to take part in the meeting, which will also include panel discussions of the effect of the new highway expansion program on the use of pesticides and of the latest developments under the Miller Pesticide Residue Amendment.

The question on who and what influences growers to buy and use agricultural chemicals will be answered by leading representatives of groups credited with having the greatest influence on the introduction of new materials and new practices to growers. The panel will include: W. A. Haffert, Jr., Editor, New Jersey Farm and Garden; John McDonald, President, National Association of Television and Radio Farm Directors; Blanchard J. Smith, Vice President, Chipman Chemical Company, Bound Brook, New Jersey; Dr. Ellsworth Fisher, Extension Entomologist, University of Wisconsin, Madison, Wisconsin; and Chief Jones, a leading pesticides dealer from Muleshoe, Texas. The moderator will be M. R. Budd, Director of Advertising, Hercules Powder Company, Wilmington, Delaware.

The panel on the highway expansion program will be moderated by Jack Dreessen, NAC Herbicide Specialist, and will include Dr. C. O. Eddy, Manager, Development Department, Niagara Chemical Division, Food Machinery & Chemical Corporation, Middleport, New York, and Chairman of the American Road Builders Association, Roadside Maintenance Subcommittee on Chemicals; R. J. McMahon, President, McMahon Brothers, commercial spray applicators, Binghamton, New York; W. C. Greene, Landscape Engineer, Connecticut State Highway Department, Hartford, Connecticut; and H. F. Clemmer, Cordinator of Technical Activities, American Road Builders' Association, Washington, D. C.

Miller Amendment Panel

Panel members for the discussion of the Miller Amendment will include Winton B. Rankin, Assistant to the Director, Bureau of Biological and Physical Sciences, Food and Drug Administration; John Coyne, Assistant Head, Pesticide Regulation Section, Plant Pest Control Branch, ARS, U. S. D. A.; Dr. George C. Decker, Entomologist and Head, Section of Economic Entomology, State Natural History Survey Division, Urbana, Illinois; and J. A. Noone, NAC Technical Adviser.

The annual meeting also will include the election of officers for 1956-57, and the election of three new members to the Board of Directors of the Association.

Entomologists—

(Continued from Page 5)

Reports from the larger milling companies indicate a tendency to employ graduate entomologists as openings occur.

Although various kinds of commercial enterprises are becoming increasingly aware of the value of entomological knowledge, the increased employment of entomologists in business organizations will depend in part to the imagination, vision and aggressiveness of entomologists themselves. Insects, directly or indirectly, affect many of the products and services we utilize. They have a tremendous affect on agriculture, on our health and comfort. Exploring ways to counteract insects and their harmful effects presents broad opportunities for entomologists in the commercial world as in government.

The need for technically-trained men and women in the agricultural chemicals industry presents a widening scope of opportunities for entomologists, plant pathologists, plant physiologists and those trained in related sciences, especially if they also have training in subjects relating to business operation.

Here & There

Ernest Hart, formerly executive vice president in charge of the chemical divisions of Food Machinery and Chemical Corporation, has been elected president of the corporation, whose headquarters are in San Jose, California. Mr. Hart is a former president of the NAC Association. **Dr. Carl F. Prutten** has succeeded Mr. Hart as executive vice president in charge of chemical divisions.

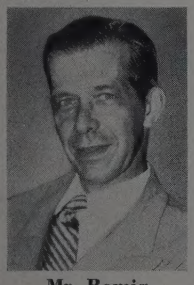
Mr. Hart

Mr. Mayfield

Paul Mayfield, general manager of the Naval Stores Department of Hercules Powder Company, Wilmington, Delaware, since 1951, has been elected vice president of the company. He is succeeded as general manager of the Naval Stores Department by **G. Fred Hogg,** who has been assistant general manager of the department since 1954. Mr. Mayfield is a former president of the NAC Association.

In other personnel changes, **P. J. Reno** was named Manager of the Agricultural Chemicals Division of Hercules' Naval Stores Department and **W. Coleman Edgar** was appointed sales manager of the division.

Gerald C. Romig has been elected president of the American Chemical Paint Company, Ambler, Pennsylvania, succeeding Leon Chersky, who has become chairman of the Board. Mr. Romig joined the company in 1927 and has served as vice president for the past 11 years. He is a member of the NAC Association's Board of Directors.



Mr. Romig

Harry B. McClure, formerly president of Carbide and Carbon Chemicals Company, New York City, has been elected a vice president of Union Carbide and Carbon Corporation. He is succeeded as president of Carbide and Carbon Chemicals Company by **D. B. Benedict,** who had been a vice president of the company since 1955.

Shea Smith III has been appointed as assistant to the President of Monsanto Chemical Company, St. Louis, Missouri. He formerly was director of marketing research. **Edmund Greene,** formerly advertising manager for the company's Organic Chemicals Division, has been named director of marketing research.

G. D. Baerman has been appointed director of sales for the Insecticides Division of Olin Mathieson Chemical Corporation, Baltimore, Maryland.

J. W. Britton has relinquished his duties as a departmental production manager in The Dow Chemical Company, Midland, Michigan, to devote full time to his responsibilities as Manager of the company's Agricultural Chemicals Division. As a production manager, Mr. Britton headed production of a group of organic and agricultural chemicals and latexes for the past 12 years. He also has been Manager of Agricultural Chemicals for the past seven years.

Harrold B. Jones has joined the Research Staff of American Smelting and Refining Company as Research Coordinator, Insecticides. Mr. Jones, who formerly was with the University of Tennessee's Agricultural Extension Service, will make his headquarters in Memphis, Tennessee.

Personnel Changes in U.S.D.A.'s Crops Section

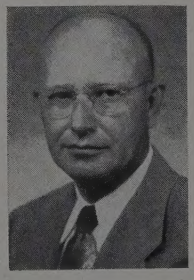
Dr. Karl S. Quisenberry succeeded Dr. A. H. Moseman as director of crops research in the U. S. Department of Agriculture's Agricultural Research Service, on July 1. Dr. Marion W. Parker replaced Dr. Quisenberry as assistant director.

Dr. Parker was head of weed investigations in the Field Crops Research Branch before he succeeded Dr. Quisenberry as assistant director. Dr. H. L. Haller, also an assistant director of crops research, will continue in his present position, in which he devotes major attention to research on pesticide chemicals and relationships between the Agricultural Research Service and industrial organizations concerned with insecticides, fungicides, herbicides, and related chemicals.

Dr. Moseman, who has directed USDA research in crop production since November 1953, is resigning from Government service to accept a position with the Rockefeller Foundation as associate director for agricultural programs.

Dr. Quisenberry has served as assistant to Dr. Moseman for the past five years, first as assistant chief of USDA's former Bureau of Plant Industry, Soils, and Agricultural Engineering, and since late 1953 as assistant director of crops research in the Agricultural Research Service. In his new position as director, he will assume responsibility for the planning and development of research in the Field Crops, Horticultural Crops, and Entomology Research Branches of the Service. A major part of this work concerns research conducted in close cooperation with State agricultural experiment stations throughout the country.

Dr. Quisenberry



Dr. Parker

Dr. William B. Ennis, Jr. assumed leadership of the Weed Investigations Section Agricultural Research Service, U. S. Department of Agriculture, on July 1, 1956. He succeeded Dr. Marion W. Parker, who became Assistant Director, Crops Research, ARS, USDA.

NEWS LETTER

Dr. Burney Named New Surgeon General, Public Health Service

Dr. Leroy E. Burney, a career government health official, has been named Surgeon General, Public Health Service, U. S. Department of Health, Education and Welfare. He succeeds Dr. Leonard A. Scheele who resigned as Surgeon General, Public Health Service, August 1, 1956 to assume the presidency of the Warner-Lambert Pharmaceutical Company's Warner-Chilcott Laboratories, Inc., Morris Plains, New Jersey.

Dr. Burney received an M. D. Degree from Indiana University in 1930, and an M.S. Degree in Public Health from the Johns Hopkins University of Hygiene and Public Health in 1932.

Commissioned in 1932

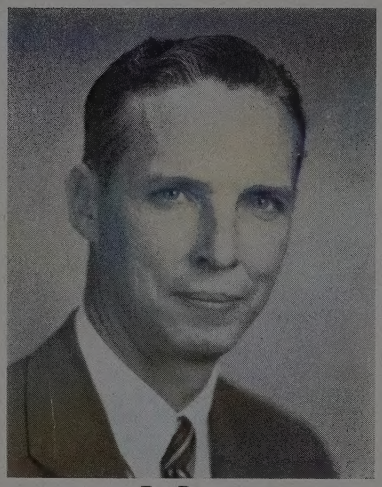
He was commissioned in the Regular Corps of the Public Health Service in 1932 and has served in the Public Health Service to date, with the exception of nine years, July 1945 to August, 1954, during which time he served as Secretary and State Health Commissioner on the Indiana State Board of Health. Dr. Burney served as Assistant Surgeon General and Deupty Chief, Bureau of State Services, Public Health Service, from August 1954 to the time of his present appointment.

Dr. Scheele, who retired after eight years as Surgeon General, played a prominent role in the World Health Organization's campaign to "Destroy Disease Carrying Insects."

Pesticide Sales Rise Predicted for 1956

The likelihood that pesticide sales for 1956 will exceed those for 1955 has been indicated by Dr. P. D. Peterson, Pico Division, Stauffer Chemical Company, Apopka, Florida.

Dr. Peterson sited population increases of the boll weevil, spruce budworm, grasshopper, spotted alfalfa aphid, corn borer, and Mediterranean fruit fly as major reasons for increased demand for pesticides in 1956.



Dr. Burney

Hawaiian Melon Fly Discovered in California

Discovery of a single specimen of the Hawaiian melon fly in California has set control agencies both in California and in Washington, D. C., into motion in order to stave off any build-up of this potentially destructive pest.

The melon fly has many of the characteristics of the Mediterranean fruit fly. Host plants are soft fruits such as melons and tomatoes.

Anti-Malaria Strategy Drawn Up By World Health Organization

A strategy for total war against malaria was drawn up by the World Health Organization's Expert Committee on Malaria during a meeting in Athens, Greece, late in June 1956.

The standard procedure, designed to eradicate the disease, calls for spraying interior walls of houses in malaria areas with long-lasting residual insecticides until malaria no longer appears.

This action will be followed by close surveillance to discover hidden pockets of infection which will be wiped out by task force teams until all possibility of infection to the population is removed.

Careful Study Needed

The WHO report stated that careful study was needed of each country or area where malaria is a problem before the standard procedure is applied, but added that in countries of the Americas and the Mediterranean where this strategy has been applied, results have stood the test of time.

According to available information some 250,000,000 people throughout the world suffer attacks of malaria each year, and about 2,500,000 die of the disease and its consequences per year.

Pesticides To Be Well Covered At American Chemical Society Meeting

Pesticides will be given more than usual attention during the 130th National Meeting of the American Chemical Society September 16 to 21 in Atlantic City, New Jersey.

The Society's Pesticides Subdivision, chairmaned this year by J. A. Noone, Technical Advisor of the National Agricultural Chemicals Association, will hold sessions on September 17 and 18. The September 17 session will be devoted to general papers, primarily on analytical methods. A symposium of relationships between molecular structure and biological activity of pesticides will be featured September 18.

Pesticides also will have a place in the program of the Society's Division of Chemical Marketing and Economics. Speakers in a symposium on chemicals in food production to be held September 18 will include F. W. Hatch, Manager, Agricultural Chemical Division, Shell Chemical Corporation, and Ernest Hart, President, Food Machinery and Chemical Corporation.

In addition, one of the meeting's Industrial and Engineering Feature Lectures will feature pesticides. The lecture, entitled, "The Impact of Chemistry and Chemical Engineering on the Production and Utilization of Agricultural Commodities", will be delivered by Dr. Bryon T. Shaw, Administrator, Agricultural Research Service, U. S. Department of Agriculture, the afternoon of September 19.

WIND TUNNEL TO AID WEED RESEARCH

by Jack Dreessen
NAC Herbicide Specialist

An unusual wind tunnel now being constructed in College Station, Texas may hold the answer to the problem of producing uniform droplets of herbicide sprays. The results can mean dollars in the pockets of American farmers.

The U. S. Department of Agriculture and the Texas Engineering Experiment Station are teaming up to do basic research on droplet formation of various herbicides under conditions simulating aircraft distribution.

The Aircraft Research Center, Texas Engineering Experiment Station has contracted to design and build a wind tunnel which will be used for the studies. The two year contract is with the Agricultural Research Service. U. S. D. A.

In charge of the project is Fred E. Weick, Director of the Aircraft Research Center. He will be assisted in the studies by Joseph C. Brusse. The entire project is expected to extend over several years with the present contract covering only the first portion.

Dispersion Devices Studied

The wind tunnel will have some unusual characteristics. The throat will be so constructed that wind velocities of 60 to 100 miles per hour can be obtained. This will allow air to move past nozzles or other devices at the same relative speeds as under aircraft dispersal conditions. At the end of the tunnel the air velocity will be reduced to 10 miles per hour or less.

It is hoped that sufficient knowledge can be gained from the fundamental studies of droplet formation that some device can be developed that will produce uniform size drops when installed in spray equipment.

Another aim of the project is to develop suitable sampling devices for testing distribution patterns of aerial applications of herbicides. Such devices would be useful in determining droplet size, drift and uniformity of coverage when used to measure efficiency of field-scale operations.

Although the contract specifically calls for the testing of herbicides, U. S. D. A. has indicated that the results from such basic research should be applicable to all types of agricultural materials.

Research on Spray Drift

What makes the research important is the significance of drop formation in herbicide applications. The size of spray droplets may influence herbicide effectiveness and at the same time will have an effect on the amount of drift encountered during spraying operations.

The problem of spray drift and related hazards is of special importance to aerial applicators of herbicides. Spray released from a spray plane may drift from a few feet up to several thousand feet, depending on prevailing wind conditions and drop size.

A drop of spray material no larger than the period at the end of this sentence (about 500 microns) will only drift 7 feet in a three mile per hour wind when released from a height of ten feet. (see chart) But, a drop that is one-fifth that size will drift 48 feet, and a drop one-fifteenth the size of the period (33 microns) will drift 409 feet when released under the same conditions. Small particles or drops of spray material are the troublesome ones, from the standpoint of drift.

The optimum conditions for releasing sprays of herbicides would therefore include droplets which are uniform in size, in a range that would minimize drift. As yet no one has been able to develop a nozzle or other dispersing device that will produce droplets of a given size.

There are many factors that influence drop formation in aerial applications. The flight of the spray plane has a marked influence on drop formation. The pressure with which the spray is released also effects drop size. The type of nozzle or other dispersing apparatus also influences the size of drops.

An airplane moving through the air sets up violent air currents that influence the formation and distribution of spray drops. There are three principal airstreams created by a plane in flight that are important. The propeller slipstream

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Herbicides Sprayed on Millions of Acres of Crops Each Year

Weed Research—

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and the right and left wing-tip vortices are involved in determining aerial distribution patterns.

There have been several attempts to alter the effects of these air currents by changing the design of the spray plane, but little success has been achieved. Regardless of the speed or size of the plane or the design of the wingtips, etc., these airflows remain to materially alter the spray distribution pattern.

The important thing in hebicide applications is a uniform cover of the weeds. This can be accomplished in two ways. The weeds can be saturated with a low concentrate spray, or a low volume, higher concentrate spray can be uniformly distributed over the plants.

Tests have shown that best herbicidal results are obtained when the spray is distributed evenly over the area to be treated. When less than two gallons per acre of spray material are applied, small droplets are necessary for even distribution. With conventional nozzles, this type of application increases the number of very small drops which are the most susceptible to drift.

If sprays of uniform droplet size could be dispersed, then the overall effectiveness could be improved without the formation of minute drops which may drift. At the same time, less spray material per acre would be needed to assure good weed control.

Savings in Application

In aerial application of herbicides this can mean a great saving in time and expense when treating large areas for weed and brush control. Most aerial applications are now made at a rate of three to five gallons of spray per acre. This is necessary to assure uniform coverage and to keep drift to a minimum. At such volumes of application, most of the spray drops are confined to a certain range in size with a few large drops and many smaller drops. These smaller drops are the ones which drift most readily and are to blame for most of the complaints of accidental crop injury.

If devices for releasing uniform drops could be effectively incorporated in aerial equipment, the amount of spray distributed per acre could be decreased without reducing efficiency of kill. At the same time extremely small droplets could be eliminated and the problem of drift would be minimized.

More Rapid Spraying

This would allow more rapid spraying of large areas, which in many instances could be vital. In most of the country wind and other climatic conditions for aerial applications of herbicides are "right" only a few hours per day during the season. Much of the time now involved in aerial spraying is consumed in returning to the loading area and in refilling the spray plane tank.

This valuable time could more profitably be employed in actual application if more acres could be covered with the same volume of spray material. This might mean saving a crop in periods of adverse weather conditions when other weed control practices cannot be employed.

It can be readily seen from the above discussion that the size of herbicide droplets has a direct bearing on the effectiveness of the application and the amount of drift that will be encountered. Uniform droplets within a range of 180 to 220 microns in size have proved to be effective and at the same time hold drift to an acceptable level.

It is hoped that the tests now being conducted at the Aircraft Research Center will provide information that will be useful in developing a device that can produce uniform droplets within this range.

The developments of an apparatus (device) that would deliver uniform, small droplets (about 200 microns in size) during aerial applications of herbicides would have the following advantages:

1. safer—if minute drops (less than 100 microns) can be eliminated, the amount of spray that drifts from the application area will be lessened.

2. more effective—when low gallonage applications are made, good coverage is necessary for control. When spray volumes of less than 2 gallons per acre are used large drops are not as effective for control as smaller drops.

3. faster, more economical spraying—less time for applications would be needed if present practices of applying 3 to 5 gallons per acre of spray could be reduced to 1 gallon or less per acre. Applicators could carry larger payloads thereby eliminating the necessity of spending large periods of time in reloading.

Spray Drift and Deposit Table
(From USDA Farmers' Bulletin No. 2062)

Drop size (microns)[1]	Visual size comparison	Time to fall 10 feet (in seconds)	Drift in 3-m.p.h. wind (in feet)	Drops per sq. inch if applied at 1 gallon per acre
5	Sea fog	4,050	18,000	9,216,000
33	Cloud	93	409	32,000
100	Mist	11	48	1,152
200	Drizzle	4.2	19	143
500	Light rain	1.59	7	9
1,000	Moderate rain	1.07	5	1
3,000	Cloudburst	.87	4	1/23
6,000	Maximum drop size	.83	3.5	1/182

[1] 1 micron=1/1000 millimeter.
16 100 micron drops=1/16 inch.

Countries Overseas Learn Insect Control From U.S.D.A.

Technical assistance in insect control is costing less and reaching larger areas each year in the Near East, North Africa, and South Asia, as more countries are helped to handle their own plant pest control problems, according to the U. S. Department of Agriculture.

USDA's Agricultural Research Service assists the State Department's International Cooperation Administration, and the governments of cooperating countries abroad, to develop practical insect control programs.

New markets for chemicals, trucks, airplanes, and insecticidal spray equipment have been created by the expansion in pest-control activities in these countries. Some 400 tons of modern insecticides, 49 spray planes, 188 trucks, 544 power sprayers, and 10,881 handsprayers have been imported into areas that never before employed large-scale insect-destroying measures.

Pesticides Boost Income In Everyday Farming

Spraying a Test Plot at an Experiment Station

A critical battle is being waged in Florida today to eradicate a fly similar in outline but smaller than the ordinary house fly. The difference is that this fly is the Mediterranean fruit fly. If uncontrolled this destructive insect would put Florida's billion-dollar citrus and vegetable industries in jeopardy.

An all-out campaign to eradicate the fly through the use of insecticides is well underway. By July 1, 1957 some $10,000,000 are expected to be spent. The amount will go mainly for aerial and ground spraying with insecticides, for roadblocks to prevent the spread of the fly in fruits transported by individuals, and for fumigation to eliminate the fly from fruits and vegetables shipped from infested areas.

Naturally, the protection of industries of this size calls for extensive control measures. Attacks by insects, plant diseases, weeds and other pests on crops even in small family farms also call for effective control measures. On small farms as well as on large ones, attacks by farm pests cause crop losses, and reduce farmers' net income.

The losses in crop, in labor and in money caused by farm pests may seem small when tallied up in terms of a 100-acre farm. When figured on a state-wide basis, however, they quickly run into millions of dollars a year.

Take the State of Missouri, for example. With a population just over 4,000,000, Missouri has 201,614 farms and about 336,600 family and hired farm workers.

The Agricultural Extension Service of Missouri reports that in 1954 crop losses due to corn insects totaled $24,171,000; losses due to grain sorghum insects was $542,990; damage by small grain insects totaled $581,001; and losses due to legume insects was $19,542,126. That makes total losses on these crops $44,834,117—or an average of $130 per family and hired farm worker—due to insects alone.

The actual losses to pests were much higher than that, for they include losses caused by plant diseases, weeds and other pests and they include losses to cattle, milk production, poultry products, and cotton. Although farmers are seldom threatened with having their entire crop wiped out by farm pests, they are suffering from every crop-destroying pest they leave uncontrolled on their farms.

Everyday Benefits

For many years the value of using pesticide sprays and dusts to protect crops against sudden and wide-spread outbreaks of insects, plant diseases and other pests has been known. During recent years studies have been made into the day-to-day economic benefits of using pest control chemicals as well as into their use in emergencies.

Probably more study along these lines has been devoted to cotton that to any other single crop. A summary of County Extension Programs on cotton insect and disease control for 1955 not only shows economic gains for growers who used pesticides, but also shows the educational effort various Extension Services are devoting to this program.

South Carolina's County Extension Program last year held 232 meetings, issued 795 news releases, published 195 issues of cotton letter, had 628 radio and 19 television broadcasts, and distributed a large number of Extension publications as part of this program.

Out of 78,605 cotton growers in the state, 67,151 planted seed treated with pesticides, and 55,034 used insecticides during the year. A check kept on acreage treated with pesticides in 1955 showed that acres treated 1 to 3 times had an average yield of 331 pounds lint per acre; acreage treated 4 to 6 times had an average yield of 397 pounds lint per acre; acreage treated 7 or more times had an average yield of 475 pounds lint per acre. At the same time, the average yield of acreages not treated was only 194 pounds lint per acre.

The South Carolina Extension Service estimates that the total value to the state of the 1955 county cotton pest control programs was $15,612,877, and that on the average $1 invested in pesticides, labor and equipment brought a return of $6.50 to the grower.

Studies on cotton carried on in Mississippi disclosed a similar pattern. The Mississippi Extension Service has estimated that in 1955 growers in the state could easily have lost $10,000,000 because of cotton insects if insecticides had not been used.

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Pesticides Boost Income—

(Continued from Page 11)

Equally impressive were studies carried out at the Delta Branch Experiment Station at Stoneville, Mississippi in 1954 and at Holly Srings, Mississippi, in 1955, on the economic benefits resulting from chemical weed control in cotton. At Stoneville, Mississippi, it was found that a combination of pre-emergence treatment with herbicides and oilings and flamings reduced the requirement of labor for weed control from 41.6 hours per acre for hoeing to 6.6 hours per acre for the chemical treatments. The costs for weed control were reduced from $17.99 to $12.65 per acre.

In the Holly Springs experiments, the use of a pre-emergence herbicide reduced hoe labor from 82.6 hours to 16.6 hours per acre with cash savings to of about $26 per acre. The Mississippi Extension Service estimates that if chemical weed control had been used on all the cotton planted in the state a saving of about $12,000,000 would have resulted. This, of course, would mean added income to cotton growers.

Fruits and Vegetables

Experiments and observations relating to fruits and vegetables have produced similar results. The Michigan State University Department of Entomology has reported, for example, that in 1953 estimated losses due to insect damage alone amounted to $3,575,000 on wheat, $11,645,000 on hay, $1,444,000 on field beans, $1,443,000 on commercial apples, $495,000 on strawberries, $215,000 on sugar beets, and like amounts for other fruits and vegetables.

The Department of Entomology also reported that these losses could be reduced by better use of insecticides and equipment and a more thorough understanding by farmers of the philosophies and skills of insect control.

An idea of how much the savings might be on one vegetable—beets—is provided by experiments carried out at the North Dakota Agricultural Experiment Station in 1955.

In experiments on the control of the sugar beet root maggot it was discovered that the proper use of insecticides increases in yield ranging from two to four tons per acre in areas where damage from the beet root maggot is severe. The estimated cost of the insecticide was approximately $2 to $2.50 per acre. If beets bring $12.75 per ton, $25.50 to $51 additional gross income could be realized for an expenditure of $2 to $2.50 per acre by the beet grower.

Plant diseases as well as insects take a big cut out of growers' income. The Arkansas Agricultural Experiment Station conducted experiments on the control of diseases attacking tomato plants over a period of several years. The results in 1950 show that yields of tomatoes were as high as 16,080 pounds per acre where the tomatoes were sprayed with fungicides while untreated plots that year produced only 8,122 pounds per acre. The spread between yields from treated and untreated plots was even greater in 1951.

Tomatoes and Wheat

The Arkansas Experiment Station concluded that while the benefits from tomato disease control vary from year to year, yields are increased in most years to such an extent that fungicides should be considered in the plans for tomato planting in the area.

While insecticides and fungicides add to growers' net income by reducing crop losses, herbicides put money into the growers' pocket both by reducing labor costs for weed control and by raising crop yields.

An impressive experiment in this field has been carried out over a period of years by the Montana Agricultural Experiment Station. Control of Canada thistle in wheat by the use of herbicides brought increasing yields over a three year period.

The first year of treatment resulted in an increased yield of 11 bushels per acre. In the second year the yield was raised another 2.3 bushels per acre, and in the third year yields went up an additional 1.1 bushels per acre. Significantly, on test plots, when herbicides were applied only the first year and were not continued, Canada thistle count began to rise again and yields began to fall off.

From a dollars and cents point of view, when wheat is selling at $2 per bushel, the Montana Agricultural Experiment Station's Department of Agricultural Economics estimates that the first year's treatment with herbicides will increase the grower's income by $22 per acre; second year treatments will add another $4.60 per acre, and third year treatments raise income by yet another $2.20.

What is the economic effect of using herbicides to control weeds in other crops? Figuring the increased value of crops through increased yield, improved quality and lower production costs, the Oregon Experiment Station's Department of Farm Crops estimates the economic benefits to growers from using herbicides in the state as follows: vegetables—$15,000; Peas—$50,000; seed crops — $500,000; wheat — $1,000,000; barley—$500,000; and oats—$100,000.

These few results from research indicate that growers have much to gain from using pesticides, not only to save crops from epidemic infestations, but for control of insects, plant diseases, weeds and other crop-destroying farm pests in year-around farming.

Pests Are World Travellers—

(Continued from Page 3)

ing material or commodities are present

Fumigation or treatment with heat or cold are other safeguards used for certain types of plant material and produce.

Detecting unauthorized arrivals of plants and plant materials—those which may be brought in with the baggage or passengers or crew, or in shipments of gifts by mail or otherwise—often taxes the ingenuity of inspectors. Coming from gardens and farms from all over the world, such material is usually grown and harvested with no suspicion that it may harbor harmful pests.

Since destructive plant pests could slip in with stores and furnishings of ships and planes, these are closely checked. Movement of military equipment and materials from overseas is subject to plant-quarantine inspection since it too may provide a means of plant pest entry.

As fast transport, particularly the airplane, shrinks distances between countries, and as foreign trade and travel expand, the danger of entry of destructive plant pests increases. Without the protection of plant quarantine inspection, our country's losses from plant pests—now running in the billions of dollars a year—would be much greater.

The severe damage caused by plant pests brought in from abroad indicates that great attention must continue to be given not only to more extensive control of farm pests in the United States, but also to the work of preventing new pests from entering the country. In this regard, the improvement of pest control in each country of the world can contribute directly to decreasing pest problems in all countries.

ADDITIONS TO OFFICIAL F. D. A. TOLERANCES

The following information is in addition to the official F.D.A. tolerances listed in the May-June issue of NAC News. For convenience of readers, the first section of the listings, including recent additions, has been reprinted in full. Tolerances issued between June 15 and August 15, 1956 are listed below. Reprints listing all tolerances up to July 27, 1956 can be obtained from NAC at a cost of 20 cents each.

PESTICIDE CHEMICALS WHICH ARE NOT UNDER THE MILLER AMENDMENT

The following pesticide chemicals are not under the Miller Amendment. They have been declared safe and require no formal tolerances or exemptions for pesticidal use; sulfur, lime, lime-sulfur, potassium polysulfide, sodium carbonate, sodium polysulfide.

PESTICIDE CHEMICALS WHICH ARE EXEMPT FROM THE REQUIREMENT OF A TOLERANCE

A. When applied to growing crops, in accordance with good agricultural practice, the following pesticide chemicals are exempt from the requirement of a tolerance:

1) **The following copper compounds:**
   - Bordeaux mixture
   - copper acetate
   - basic copper carbonate (malachite)
   - copper-lime mixtures
   - copper oxychloride
   - copper silicate
   - copper sulfate basic
   - copper-zinc chromate
   - cuprous oxide
2) **Allethrin (allyl homolog of cinerin I) on beans, broccoli, brussels sprouts, cabbage, cauliflower, collards, horseradish, kale, kohlrabi, lettuce, mushrooms, mustard greens, radish, rutabagas, turnips,**
3) **N-Ocytylbicyclo-(2,2,1) — 5-heptene-2,3-dicarboximide)**
4) **Petroleum oils**
5) **Piperonyl butoxide**
6) **Piperonyl cyclonene**
7) **N-Propyl isome**
8) **Pyrethrum and pyrethrins**
9) **Rotenone or derris or cube roots**
10) **Ryania**
11) **Sabadilla**

These pesticides are not exempted from the requirement of a tolerance when applied to a crop at the time of or after harvest.

B. When applied to raw agricultural commodities after harvest in accordance with good agricultural practice, the following pesticide chemicals are exempt from the requirements of a tolerance:

1) **Carbon disulfide (exempt when used as post-harvest fumigant on barley, corn, oats, popcorn, rice, rye, sorghum (milo), wheat.)**
2) **Ammonia (exempt for post-harvest use on grapefruit, lemons, oranges.)**
3) **Carbon tetrachloride (exempt when used as post-harvest fumigant on barley, corn, oats, popcorn, rice, rye, sorghum (milo), wheat.)**
4) **Ethylene dichloride (exempt when used as post-harvest fumigant on barley, corn, oats, popcorn, rice, rye, sorghum (milo), wheat.)**
5) **Ethylene dibromide (organic bromide residues exempt when used as a fumigant on barley, corn, oats, popcorn, rice, rye, sorghum (milo), wheat.)**

A tolerance of 50 p.p.m of inorganic bromide residues (calculated as Br.) from ethylene dibromide has been set on the same crops.

ZERO TOLERANCES

The following poisonous or deleterious substances should not be used under conditions that will leave any toxic residues from them on fruits or vegetables as prepared for market.

- Calcium cyanide (tolerances established for certain uses. See under specific crops.)
- Dinitro-O-sec. butylphenol.
- Dinitro-O-cresol.
- Hexaethyl tetraphosphate.
- Mercury-containing compounds.
- Hydrocyanic acid (tolerances established for post-harvest use. See under specific crops.)
- Selenium and selenium compounds.
- Tetraethyl pyrophosphate.

The Zero Tolerances listed above are from the 1950 hearings. Other Zero Tolerances established under the Miller Amendment are listed under specific crops.

NOTE: Many uses of pesticides leave no residues when the pesticides are used as directed. Where no residues result from a certain use of a pesticide, it is not necessary to obtain a formal tolerance. However, this has been done in some instances and a number of Zero tolerances have been established because no residues result from use of the pesticides according to directions. All pesticides with Zero tolerances or without numerical tolerances (exempt pesticides excepted) should be used only under conditons which leave no residues in or on raw agricultural commodities as prepared for market. For detailed information on specific pesticides consult the manufacturer.

FRUITS

Apples and pears

Pesticide	*Tolerance*
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.
Sodium O-phenylphenate	5 p.p.m.

Crabapples

Pesticide	*Tolerance*
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

(4) Blueberries (huckleberries).

Pesticide	*Tolerance*
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

(5) Cherries

Pesticide	*Tolerance*
Allethrin (post-harvest application)	4 p.p.m.
Diethyl diphenyl dichloroethane	15 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

Oranges.

Pesticide	*Tolerance*
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

Grapefruit, lemons, limes, oranges and tangerines

Pesticide	*Tolerance*
Monuron	1 p.p.m.

Grapefruit, lemons and oranges

Pesticide	*Tolerance*
Diphenyl	110 p.p.m.
Systox	0.75 p.p.m.

Citrus citron

Pesticide	*Tolerance*
Monuron	1 p.p.m.

Kumquats

Pesticide	*Tolerance*
Monuron	1 p.p.m.

Tangelos

Pesticide	*Tolerance*
Monuron	1 p.p.m.

(7) Cranberries

Pesticide	*Tolerance*
Toxaphene	7 p.p.m.

(8) Currants.

Pesticide	*Tolerance*
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

(10) Figs.

Pesticide	*Tolerance*
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

FRUITS—Continued from Page 13

(11) Gooseberries.

Pesticide	Tolerance
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

(12) Grapes.

Pesticide	Tolerance
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.
Systox	1.25 p.p.m.

(13) Guavas.

Pesticide	Tolerance
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

(14) Mangoes.

Pesticide	Tolerance
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

Peaches.

Pesticide	Tolerance
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

(18) Pineapples.

Pesticide	Tolerance
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

(19) Plums (fresh prunes)

Pesticide	Tolerance
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

Raspberries, Blackberries, loganberries, boysenberries and dewberries.

Pesticide	Tolerance
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

VEGETABLES

Beans

Pesticide	Tolerance
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

Corn (including popcorn)

Pesticide	Tolerance
Ethylene dibromide (post harvest fumigant)	50 p.p.m. of inorganic bromide calculated as Br

Muskmelons.

Pesticide	Tolerance
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

(36) Lettuce

Pesticide	Tolerance
Diethyl diphenyl dichloroethane	15 p.p.m.
Systox	0.75 p.p.m.

(43) Parsnips (with or without tops) or parsnip greens alone

Pesticide	Tolerance
Toxaphene	7 p.p.m.

(44) Peanuts.

Pesticide	Tolerance
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

(45) Peas.

Pesticide	Tolerance
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

(46) Peppers (Pimientos)

Pesticide	Tolerance
Toxaphene	7 p.p.m.

Horseradish

Pesticide	Tolerance
Toxaphene	7 p.p.m.

(51) Spinach

Pesticide	Tolerance
Diethyl diphenyl dichloroethane	15 p.p.m.

(53) Sweet Potatoes

Pesticide	Tolerance
DDT (post harvest use)	7 p.p.m.

Rutabagas

Pesticide	Tolerance
Toxaphene	7 p.p.m.

(55) Tomatoes.

Pesticide	Tolerance
Allethrin (post-harvest application)	4 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

GRAIN CROPS

(57) Barley

Pesticide	Tolerance
Ethylene dibromide (post harvest fumigant)	50 p.p.m. of inorganic bromide calculated as Br

(58) Buckwheat

Pesticide	Tolerance
Calcium cyanide	25 p.p.m.

(59) Oats

Pesticide	Tolerance
Calcium cyanide	25 p.p.m.
Ethylene dibromide (post harvest fumigant)	50 p.p.m. of inorganic bromide calculated as Br
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

(60) Rice

Pesticide	Tolerance
Ethylene dibromide (post harvest fumigant)	50 p.p.m. of inorganic bromide calculated as Br

(61) Rye

Pesticide	Tolerance
Ethylene dibromide (post harvest fumigant)	50 p.p.m. of inorganic bromide calculated as Br

(62) Wheat

Pesticide	Tolerance
Ethylene dibromide (post harvest fumigant)	50 p.p.m. of inorganic bromide calculated as Br

(64) Sorghum grain

Pesticide	Tolerance
Calcium cyanide	25 p.p.m.

(65) Grain sorghum (Milo)

Pesticide	Tolerance
Ethylene dibromide (post harvest fumigant)	50 p.p.m. of inorganic bromide calculated as Br

(66) Grain sorghum.

Pesticide	Tolerance
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

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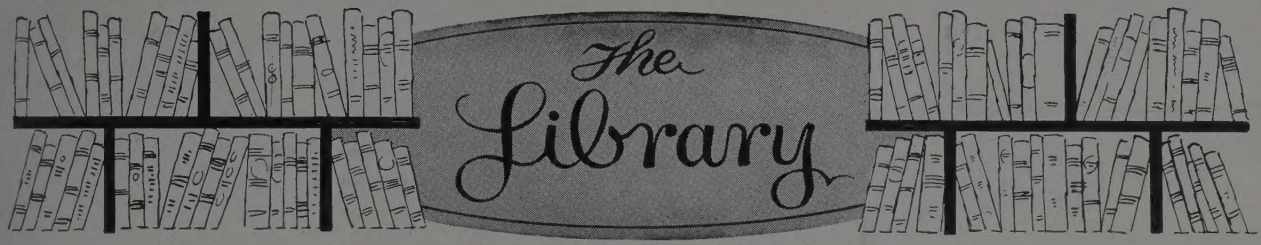

MEETINGS

National Agricultural Chemicals Association. 23rd Annual Meeting. September 5-7. The Essex and Sussex, Spring Lake, New Jersey.

American Chemical Society. 130th National Meeting. September 16-21. Convention Hall and Haddon Hall, Atlantic City, New Jersey.

Western Agricultural Chemicals Association. Annual Meeting. October 9. Villa Hotel, San Mateo, California.

Association of American Pesticide Control Officials. States Relations Committee Meeting. October 19. Annual Meeting. October 20. Shoreham Hotel, Washington, D. C.

National Aviation Trades Association. National Convention. November 1-3. Hotel Chase, St. Louis, Missouri.

Vegetable Growers Association of America. 48th Annual Convention. November 27-30. Civic Auditorium and Pantlind Hotel, Grand Rapids, Michigan.

North Central Weed Control Conference. December 10-12. Hotel Sherman, Chicago, Illinois.

Entomological Society of America. National Meeting. December 27-31. Hotel New Yorker, New York, N. Y.

PUBLICATIONS

Principles of Fungicidal Action. Dr. James G. Horsfall, Director, The Connecticut Agricultural Experiment Station, New Haven, Connecticut. Covers landmarks in fungicide history, how fungicides work, fungicide protection and measurement, chelation and physican toxicity. Many new discoveries are discussed in sections dealing with dithiocarbamates, quinones, imidazolines and trichloromethylthiophthalimidine. 279 pages. $6.50. Chronica Botanica Co., 977 Main Street, Waltham 54, Mass.

Warning Labels. Manual L-1. Includes definitions of terms, the preparation of warning labels, and illustrated sections on warning labels for 186 industrial and 92 pesticidal chemicals. 115 pages. $1.00. Manufacturing Chemists' Association, Inc., 1625 Eye Street, N. W., Washington 6, D. C.

Insecticide Recommendations of the Entomology Research Branch for the Control of Insects Attacking Crops and Livestock, 1956 Season. Agriculture Handbook No. AH 103. 97 pages. 50 cents. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Isotopes—An Eight-Year Summary of U. S. Distribution and Utilization. A resume of isotope utilization during the U. S. Atomic Energy Commission's distribution program. Includes information on agricultural studies involving the use of isotopes and specific sections on growth regulators, herbicides, plant disease, fungicide and insect studies. $2.00. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

TOLERANCES—*Continued from Page 14*

TREE NUTS

(85) Almonds.

Pesticide	*Tolerance*
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.
Systox	0.75 p.p.m.

Almond hulls

Pesticide	*Tolerance*
Systox	5 p.p.m.

Hazel nuts

Pesticide	*Tolerance*
Toxaphene	7 p.p.m.

Hickory nuts

Pesticide	*Tolerance*
Toxaphene	7 p.p.m.

(87) Pecans

Pesticide	*Tolerance*
Systox	0.75 p.p.m.
Toxaphene	7 p.p.m.

(88) Walnuts

Pesticide	*Tolerance*
Toxaphene	7 p.p.m.
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

OTHER CROPS

(91) Cocoa beans.

Pesticide	*Tolerance*
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

(93) Cotton seed.

Pesticide	*Tolerance*
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

Copra.

Pesticide	*Tolerance*
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

Flaxseed

Pesticide	*Tolerance*
Piperonyl butoxide (post-harvest application).	8 p.p.m.
Pyrethrins (post-harvest application)	1 p.p.m.

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